AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1-89. (Canceled)

90. (New) A diverse population of labels, comprising thirty or more unique labels, wherein each of said unique labels comprises a molecule, said molecule comprising a plurality of genedigits, each genedigit being of predetermined sequence, wherein at least two of said genedigits are each attached to a respective anti-genedigit, each said anti-genedigit being attached to at least one label monomer, and wherein said population is in solution.

91. (New) A diverse population of labels, comprising thirty or more unique labels, wherein the labels each comprise a molecule, said molecule comprising (i) a plurality of genedigits, each genedigit being of predetermined sequence, wherein at least two of said genedigits are each attached to a respective anti-genedigit, each said anti-genedigit being attached to at least one label monomer, and (ii) a target-specific nucleotide sequence, said target-specific nucleotide sequence being noncovalently attached to an unlabeled target molecule.

92. (New) A diverse population of labels, comprising thirty or more unique labels, wherein each of said unique labels comprises a molecule, said molecule comprising a plurality of genedigits, each genedigit being of predetermined sequence, wherein at least two of said genedigits are each attached to a respective anti-genedigit, each said anti-genedigit being attached to at least one label monomer, wherein each said molecule and each said anti-genedigit is a nucleic acid and each said molecule is noncovalently attached to an unlabeled bridging nucleic acid.

93. (New) A diverse population of labels, comprising thirty or more unique labels, wherein each of said unique labels comprises a synthetic nucleic acid molecule, said

synthetic nucleic acid molecule comprising (i) a plurality of genedigits, each genedigit being of predetermined sequence, wherein at least two of said genedigits are each attached to a respective anti-genedigit, each said anti-genedigit being attached to at least one label monomer, and (ii) a target-specific nucleotide sequence.

94. (New) A diverse population of labels, comprising thirty or more unique labels, wherein each of said unique labels comprises a molecule, said molecule comprising a plurality of genedigits, each genedigit being a DNA of predetermined sequence, wherein at least two of said genedigits are each attached to a respective anti-genedigit, each said anti-genedigit being attached to at least one label monomer.

95. (New) The diverse population of claim 90, wherein the molecule further comprises a target-specific nucleotide sequence, said target-specific nucleotide sequence being noncovalently attached to an unlabeled target molecule.

96. (New) The diverse population of claim 90, wherein each said molecule and each said anti-genedigit is a nucleic acid and each said molecule is noncovalently attached to an unlabeled bridging nucleic acid.

97. (New) The diverse population of claim 90, wherein the molecule is a synthetic nucleic acid molecule which further comprises a target-specific nucleotide sequence.

98. (New) The diverse population of claim 90, wherein each genedigit is a DNA.

99. (New) The diverse population of claim 91, wherein each said molecule and each said anti-genedigit is a nucleic acid and each said molecule is noncovalently attached to an unlabeled bridging nucleic acid.

100. (New) The diverse population of claim 91, wherein the molecule is a synthetic nucleic acid molecule which further comprises a target-specific nucleotide sequence.

101. (New) The diverse population of claim 91, wherein each genedigit is a DNA.

102. (New) The diverse population of claim 92, wherein the molecule is a synthetic nucleic acid molecule which further comprises a target-specific nucleotide sequence.

103. (New) The diverse population of claim 92, wherein each genedigit is a DNA.

104. (New) The diverse population of claim 93, wherein each genedigit is a DNA.

105. (New) The diverse population of claim 90, wherein each genedigit is a DNA.

106. (New) The diverse population of claim 91, wherein each said molecule and each said anti-genedigit is a nucleic acid and each said molecule is noncovalently attached to an unlabeled bridging nucleic acid.

107. (New) The diverse population of claim 91, wherein the molecule is a synthetic nucleic acid molecule which further comprises a target-specific nucleotide sequence.

108. (New) The diverse population of claim 91, wherein each genedigit is a DNA.

109. (New) The diverse population of claim 90, wherein said molecule is a nucleic acid which further comprises a target-specific nucleotide sequence.

110. (New) The diverse population of claim 91, wherein said molecule is a nucleic acid.

111. (New) The diverse population of claim 92, wherein the molecule is a nucleic acid molecule which further comprises a target-specific nucleotide sequence.

112. (New) The diverse population of claim 94, wherein the molecule is a nucleic acid molecule which further comprises a target-specific nucleotide sequence.

113. (New) The diverse population of claim 92, wherein the molecule is noncovalently attached to a target molecule.

114. (New) The diverse population of claim 96, wherein the molecule is noncovalently attached to a target molecule.

115. (New) The diverse population of claim 99, wherein the molecule is noncovalently attached to a target molecule.

116. (New) The diverse population of claim 102, wherein the molecule is noncovalently attached to a target molecule.

117. (New) The diverse population of claim 103, wherein the molecule is noncovalently attached to a target molecule.

118. (New) The diverse population of claim 106, wherein the molecule is noncovalently attached to a target molecule.

119. (New) The diverse population of claim 111, wherein the molecule is noncovalently attached to a target molecule.

120. (New) The diverse population of any one of claims 113-119, wherein the molecule and the target molecule is each a DNA molecule and wherein said noncovalent attachment is via hybridization.

121. (New) The diverse population of any one of claims 113-119, wherein the target molecule is unlabeled.

122. (New) The diverse population of claim 120, wherein the target molecule is unlabeled.

123. (New) The diverse population of any one of claims 90-119, wherein each said genedigit and each said antigenedigit is DNA, and wherein said genedigit and said antigenedigit are attached to one another noncovalently via hybridization.

124. (New) The diverse population of any one of claims 90-119, wherein each of at least two of said genedigits comprises a repeated core element.

125. (New) The diverse population of any one of claims 90-119, wherein at least two of said genedigits have different sequences.

126. (New) The diverse population of any one of claims 90-119, wherein said plurality of said genedigits is at least four genedigits, said at least four genedigits being each attached to a respective anti-genedigit.

127. (New) The diverse population of any one of claims 90-119, wherein said plurality of said genedigits is at least five genedigits, said at least five genedigits being each attached to a respective anti-genedigit.

128. (New) The diverse population of any one of claims 90-119, wherein at least one label monomer is light-emitting.

129. (New) The diverse population of claim 128, wherein said label monomer is fluorescent.

130. (New) The diverse population of any one of claims 90-119, wherein each of said unique labels comprises a mixture of two or more different label monomers.

131. (New) The diverse population of claim 91, 93, 95, 97, 100, 102, 107, 109, 111, or 112, wherein the target-specific nucleotide sequence in each unique label is different.

132. (New) The diverse population of any one of claims 90-119, wherein at least one label monomer is a quantum dot.

133. (New) The diverse population of any one of claims 90-119, wherein at least one anti-genedigit is a dendrimer.

134. (New) The diverse population of claim 133, wherein the dendrimer is a fork-like dendrimer.

135. (New) The diverse population of claim 133, wherein the dendrimer is a comb-like dendrimer.

136. (New) The diverse population of any one of claims 90-119, wherein each said anti-genedigit is covalently attached to each said at least one label monomer.

137. (New) The diverse population of claim 136, wherein each said at least one label monomer is fluorescent.

138. (New) The diverse population of any one of claims 91, 95 and 113-119, wherein each said target molecule is attached to a chip, microarray or bead.

139. (New) The diverse population of claim 120, wherein each said target molecule is attached to a chip, microarray or bead.

140. (New) The diverse population of claim 121, wherein each said target molecule is attached to a chip, microarray or bead.

141. (New) The diverse population of claim 122, wherein each said target molecule is attached to a chip, microarray or bead.

142. (New) The diverse population of any one of claims 90-119, comprising 40 or more unique labels.

143. (New) The diverse population of claim 142, comprising 100 or more unique labels.

144. (New) The diverse population of claim 143, comprising 150 or more unique labels.

145. (New) The diverse population of claim 144, comprising 200 or more unique labels.

146. (New) The diverse population of claim 145, comprising 500 or more unique labels.

147. (New) The diverse population of claim 146, comprising 1,000 or more unique labels.

148. (New) The diverse population of claim 147, comprising 2,000 or more unique labels.

149. (New) The diverse population of claim 148, comprising 5,000 or more unique labels.

150. (New) The diverse population of claim 149, comprising $1x10^4$ or more unique labels.

151. (New) A diverse population of labels, comprising thirty or more unique labels, wherein each of said unique labels comprises a molecule, said molecule comprising a plurality of genedigits, each genedigit being of predetermined sequence, wherein at least two of said genedigits are each attached to a respective anti-genedigit, each said anti-genedigit being attached to at least one label monomer, and wherein said label monomer is a quantum dot.

152. (New) A diverse population of labels, comprising 100 or more unique labels, wherein each of said unique labels comprises a nucleic acid molecule, said nucleic acid molecule comprising (i) at least four genedigits, each genedigit being of predetermined sequence, wherein said at least four genedigits are each noncovalently hybridized to a respective anti-genedigit, each said anti-genedigit being attached to at least one label monomer; and (ii) a target-specific nucleotide sequence, said target-specific nucleotide sequence being noncovalently hybridized to an unlabeled target molecule.

153. (New) The diverse population of claim 152, wherein each said anti-genedigit is covalently attached to each said at least one label monomer.

154. (New) The diverse population of claim 153, wherein said at least one label monomer is fluorescent.

155. (New) The diverse population of any one of claims 152-154, wherein each said nucleic acid molecule is noncovalently attached via hybridization to an unlabeled bridging nucleic acid.

156. (New) The diverse population of any one of claims 152-154, wherein each said unlabeled target molecule is attached to a chip, microarray or bead.

157. (New) A labeling kit, said kit comprising (i) in a first container, thirty or more unique molecules, each said molecule comprising a plurality of genedigits, each genedigit being of predetermined sequence, and (ii) in one or more other containers, a plurality of respective anti-genedigits, each said anti-genedigit being attached to at least one label monomer.

158. (New) The labeling kit of claim 157, wherein each of at least two of said genedigits comprises a repeated core element.

159. (New) The labeling kit of claim 157, wherein at least one label monomer is light-emitting.

160. (New) The labeling kit of claim 159, wherein said label monomer is fluorescent.

161. (New) The labeling kit of claim 157, wherein at least one label monomer is a quantum dot.

162. (New) The labeling kit of claim 157, wherein at least one anti-genedigit is a dendrimer.

163. (New) The labeling kit of claim 162, wherein the dendrimer is a fork-like dendrimer.

164. (New) The labeling kit of claim 162, wherein the dendrimer is a comb-like dendrimer.

165. (New) The labeling kit of any one of claims 157-162, wherein each molecule and each anti-genedigit is a nucleic acid.

166. (New) The labeling kit of claim 165, wherein each molecule and each anti-genedigit is a DNA.

167. (New) The labeling kit of claim 165, wherein each molecule further comprises a target-specific nucleotide sequence.

168. (New) The labeling kit of claim 165, wherein each molecule is noncovalently attached to an unlabeled bridging nucleic acid.

169. (New) The labeling kit of claim 157, comprising 40 or more unique molecules.

170. (New) The labeling kit of claim 169, comprising 100 or more unique molecules.

171. (New) The labeling kit of claim 170, comprising 150 or more unique molecules.

172. (New) The labeling kit of claim 171, comprising 200 or more unique molecules.

173. (New) The labeling kit of claim 172, comprising 500 or more unique molecules.

174. (New) The labeling kit of claim 173, comprising 1,000 or more unique molecules.

175. (New) The labeling kit of claim 174, comprising 2,000 or more unique molecules.

176. (New) The labeling kit of claim 175, comprising 5,000 or more unique molecules.

177. (New) The labeling kit of claim 176, comprising $1x10^4$ or more unique molecules.